Dynamometer Study of Off-Cycle Exhaust Emissions

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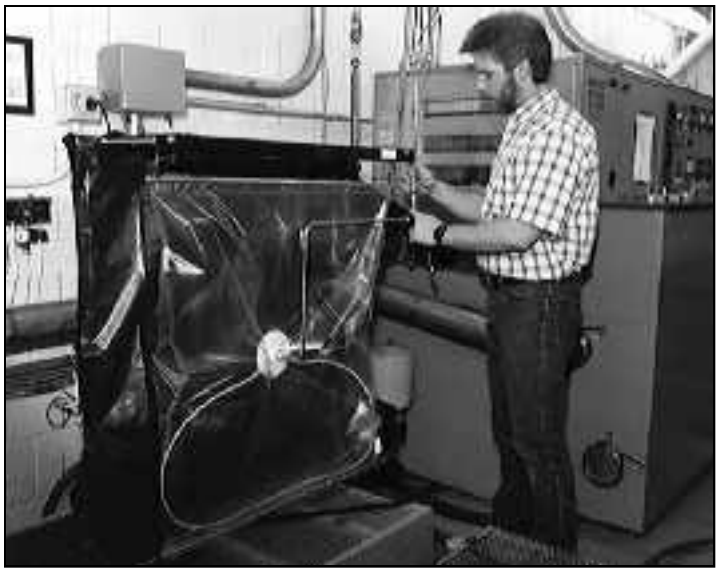
Objective

To characterize the impact of off-cycle driving on mass exhaust emissions, toxics, and reactivity as a function of fuel composition for gasoline, M85 (85% methanol [MeOH]), E85 (85% ethanol [EtOH]), and compressed natural gas (CNG) vehicles.

Approach

Seven gasoline vehicles, three flexible fuel vehicles (FFVs) calibrated for MeOH up to M85, three FFVs calibrated for EtOH up to E85, and three dedicated CNG vehicles were tested with several fuels. An industry average gasoline (IAG), a California Phase 2 reformulated gasoline (RFG), two M85 blends, two M10 (10% MeOH, 90% gasoline) blends, one E85 blend, and four CNG blends were tested in the vehicles. Exhaust emission tests were run on a 48-inch chassis dynamometer using a "four-bag cycle" proposed by the Environmental Protection Agency (EPA). Tailpipe mass emissions and species were measured with each vehicle/fuel combination.



Vehicle emissions bag sampling system

Accomplishments

All tests are complete. It was found that benefits derived from the use of reformulated gasoline and alternative fuels carry over to high-speed, high-load off-cycle emissions as well. Overall, no concerns regarding regulated pollutant emission rates, the reactivity of the emissions, or the emissions of the air toxics were uncovered in this study.

Future Direction

Results from this study will be used to improve ambient air quality models. The Auto/Oil-Air Quality Improvement Research Program modeling subcommittee will be using this data in their work to determine the effect of reformulated fuels and alternative fuels on air quality. This project is complete.

Publications

Peltier, R.J. and R.A. Gorse, Jr. 1993. "Dynamometer Study of Off-Cycle Emissions," presented at the Contractors Coordination Meeting, Detroit, MI. October.

Gorse, R.A. Jr. 1995. "U.S. Auto/Oil Off-Cycle Emissions Program," presented at the CRC Fifth On-Road Vehicle Emissions Workshop, San Diego, CA. April.

Cadle, Steven H.; Groblicki, Peter J.; Gorse, Robert A.; Hood, Jeffrey; Korduba-Sawicky, Dianna; Sherman, Michael. "A Dynamometer Study of Off-Cycle Exhaust Emissions—The Auto/Oil Air Quality Improvement Research Program," SAE paper, 1995 Spring F&L meeting.

Auto/Oil Air Quality Improvement Research Program Technical Bulletin No. 19. "Dynamometer Study of Off-Cycle Exhaust Emissions" April 1996.

Cadle, Steven H.; Groblicki, Peter J.; Gorse, Robert A.; Hood, Jeffery; Korduba-Sawicky, Dianna; Sherman, Michael. "A Dynamometer Study of Off-Cycle Exhaust Emissions—The Auto/Oil Air Quality Improvement Research Program," SAE paper, 1996 Spring F&L meeting.